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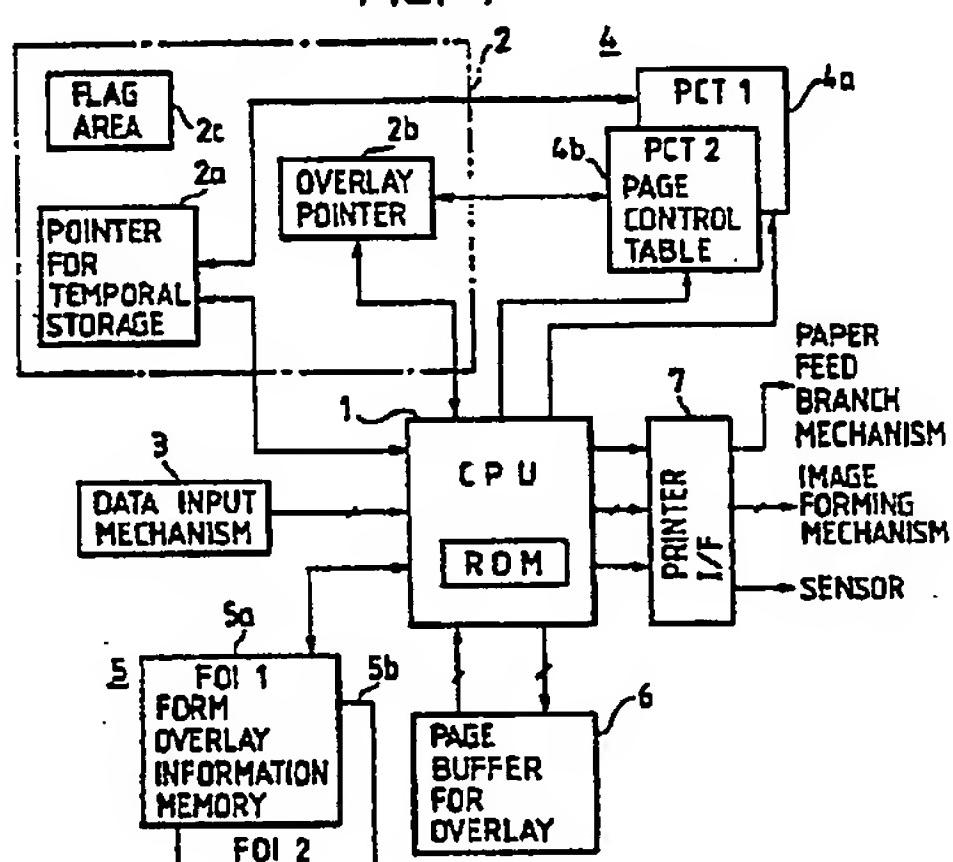
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United Kingdom

(54) Recording control apparatus

(57) An apparatus for effectively controlling the overlay recording on one side or both sides of a sheet, has a data input unit 3, a first memory for storing format data, an output unit for overlaying the data from the input unit with the format data of the first memory, and a second memory for storing the prior format data in introducing new format data into the first memory, thereby preventing the loss of format data at the shifting of overlay format.

FIG. 1



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FIG. 1

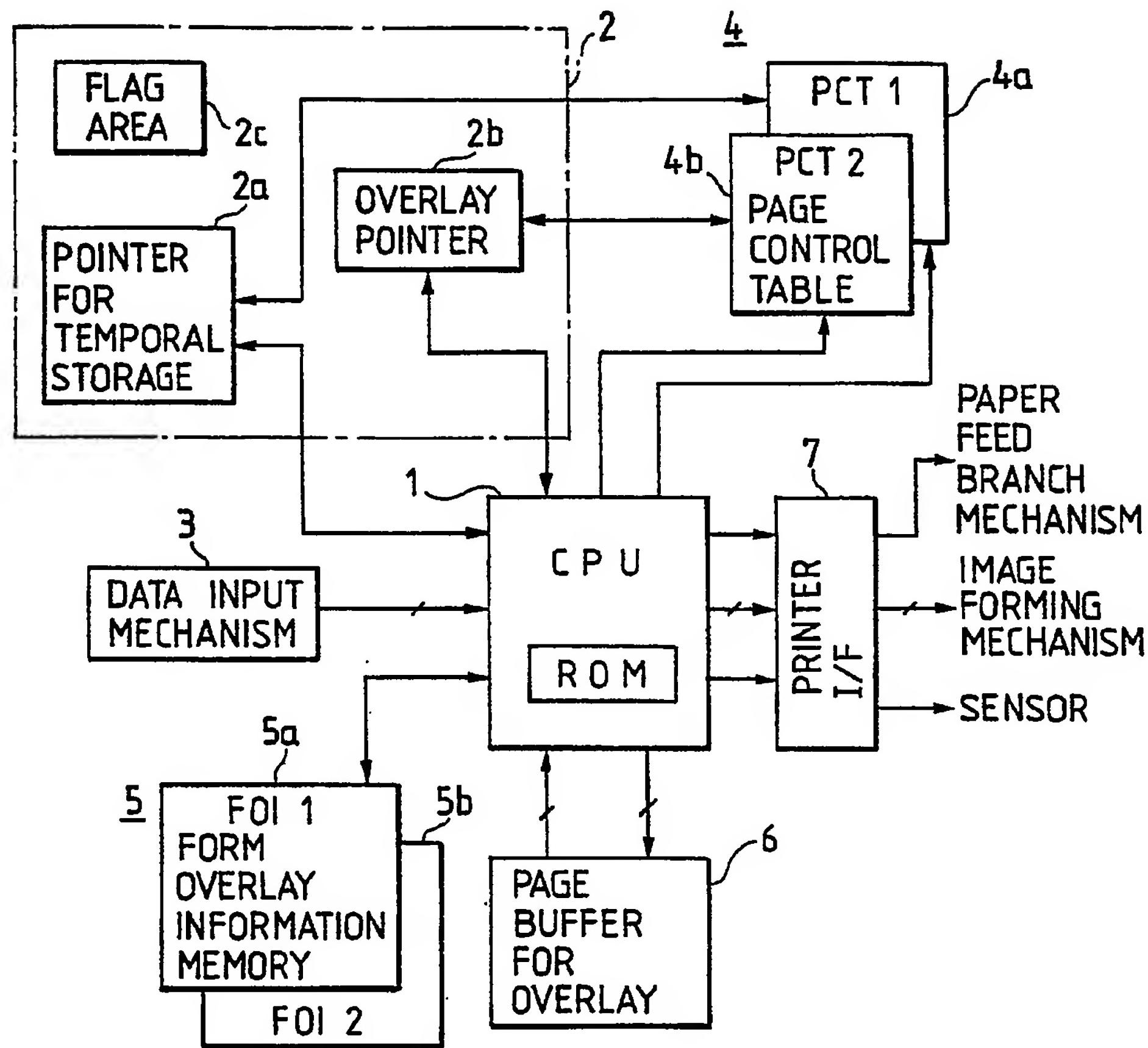
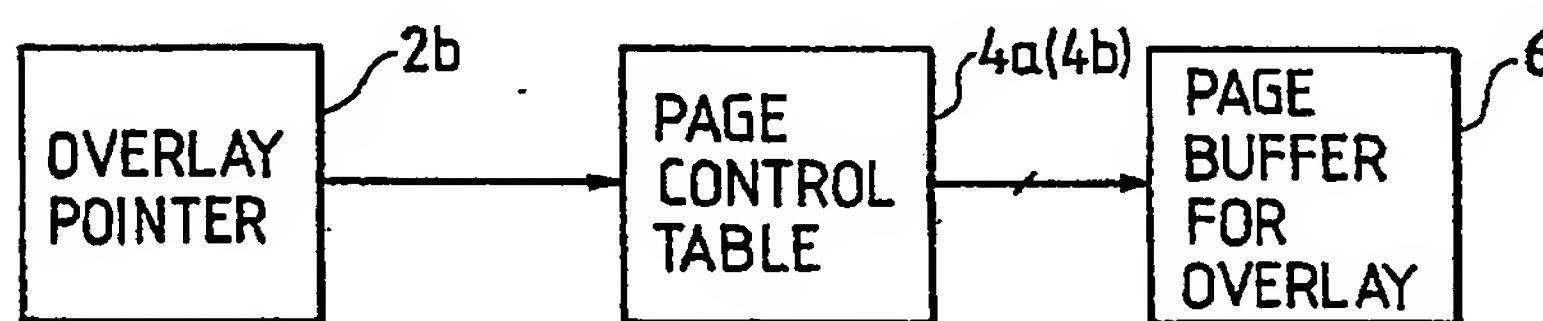


FIG. 2



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FIG. 3A

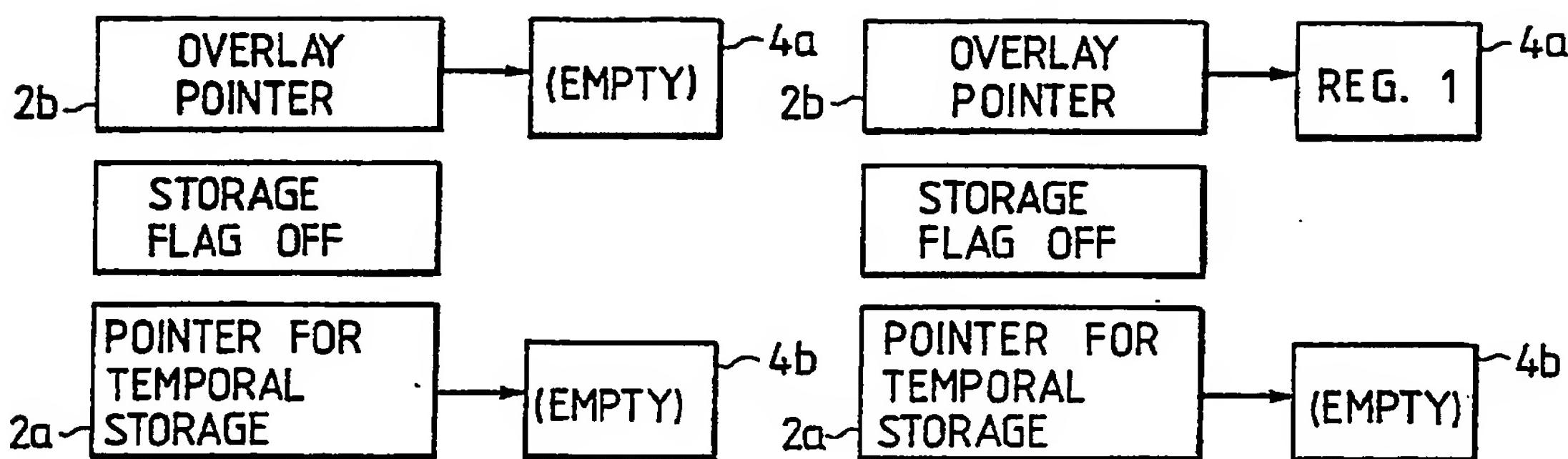


FIG. 3B

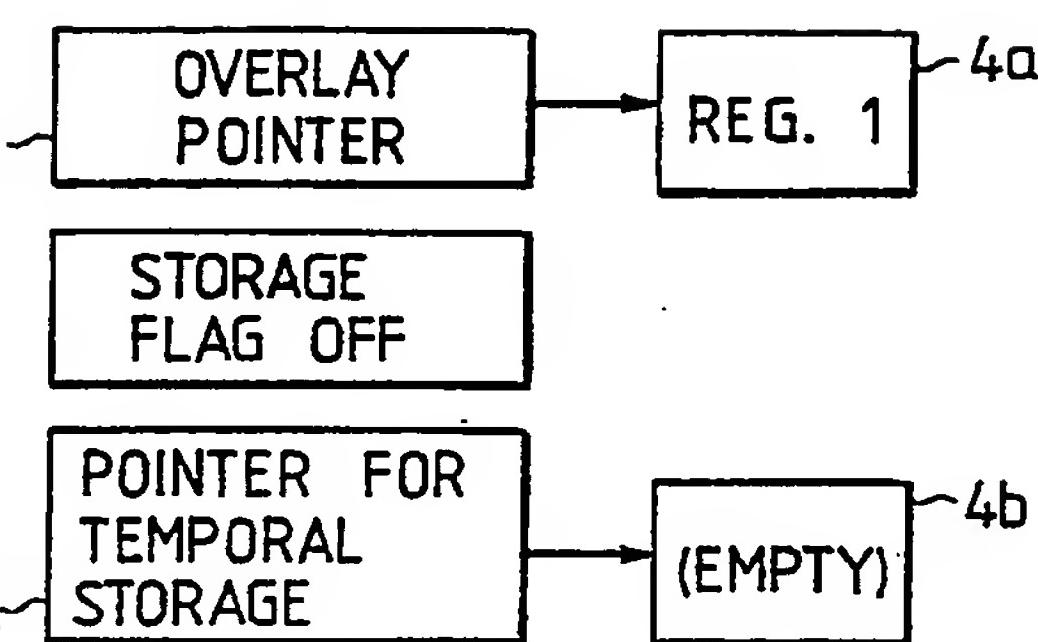


FIG. 3C

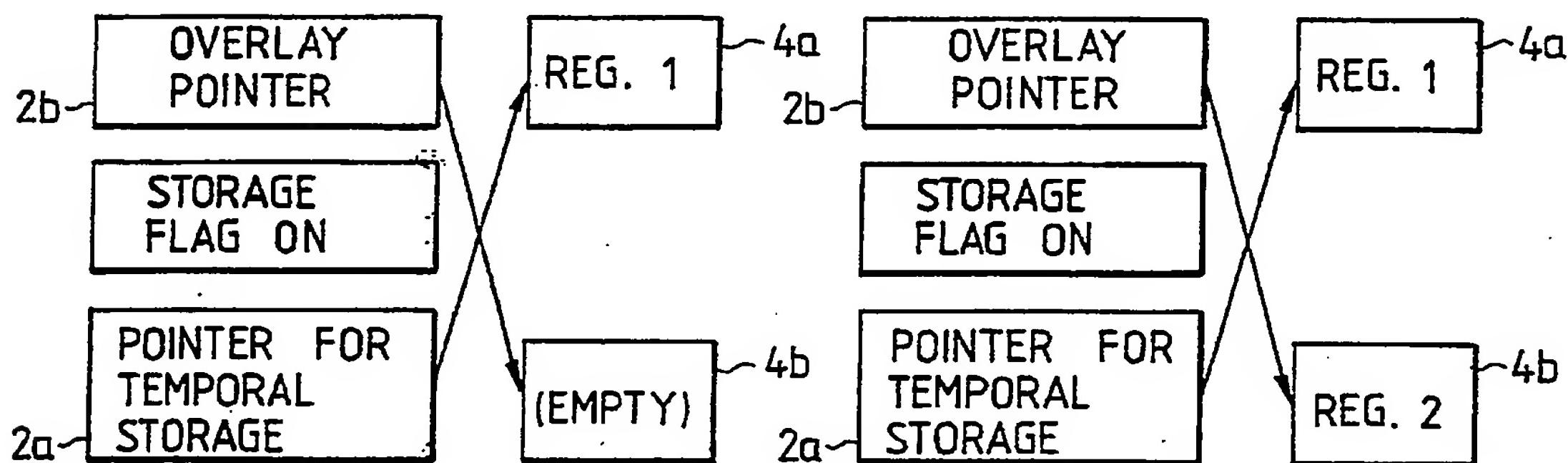


FIG. 3D

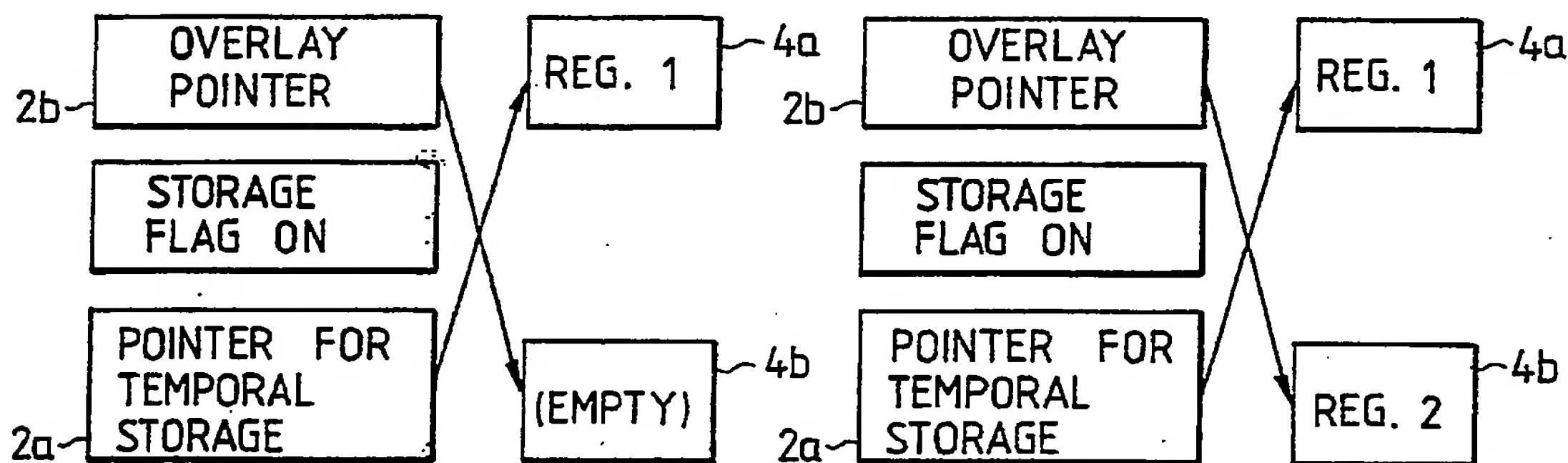
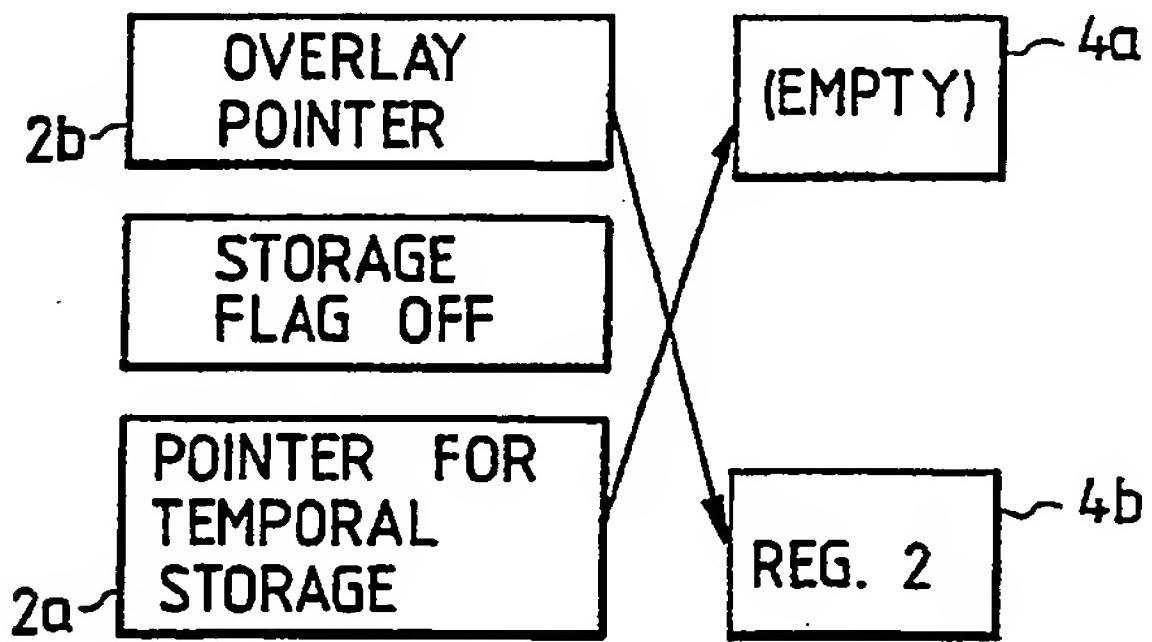


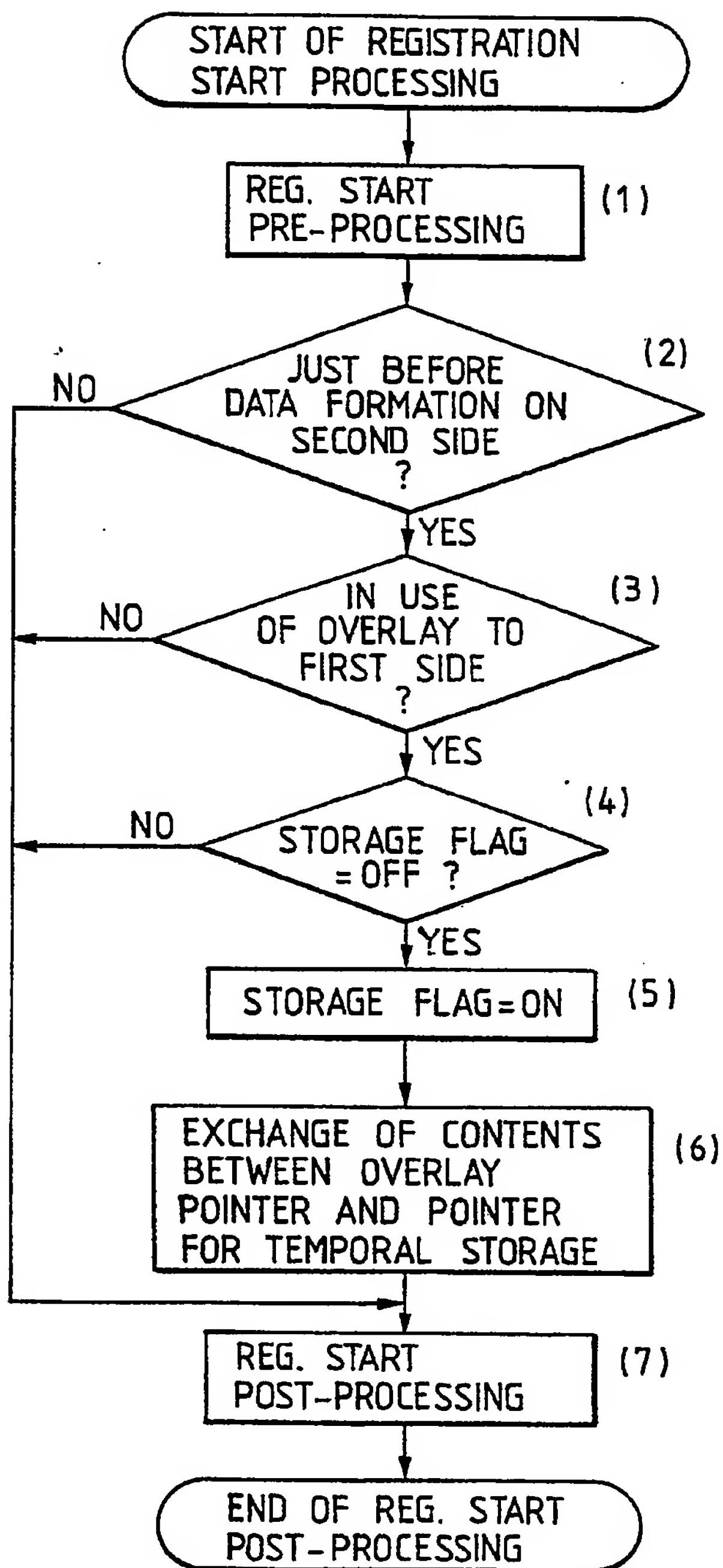
FIG. 3E



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FIG. 4



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FIG. 5

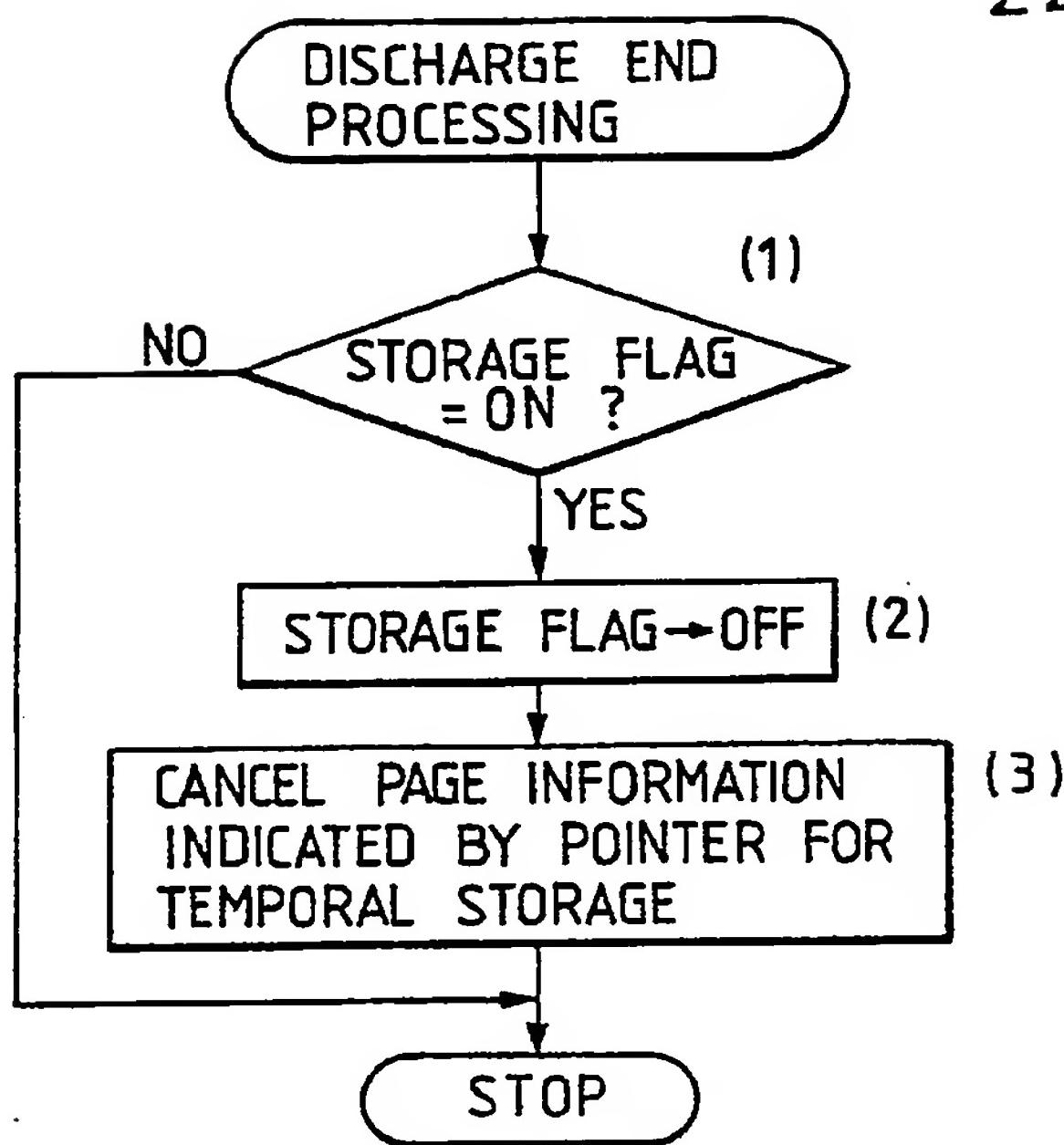


FIG. 6

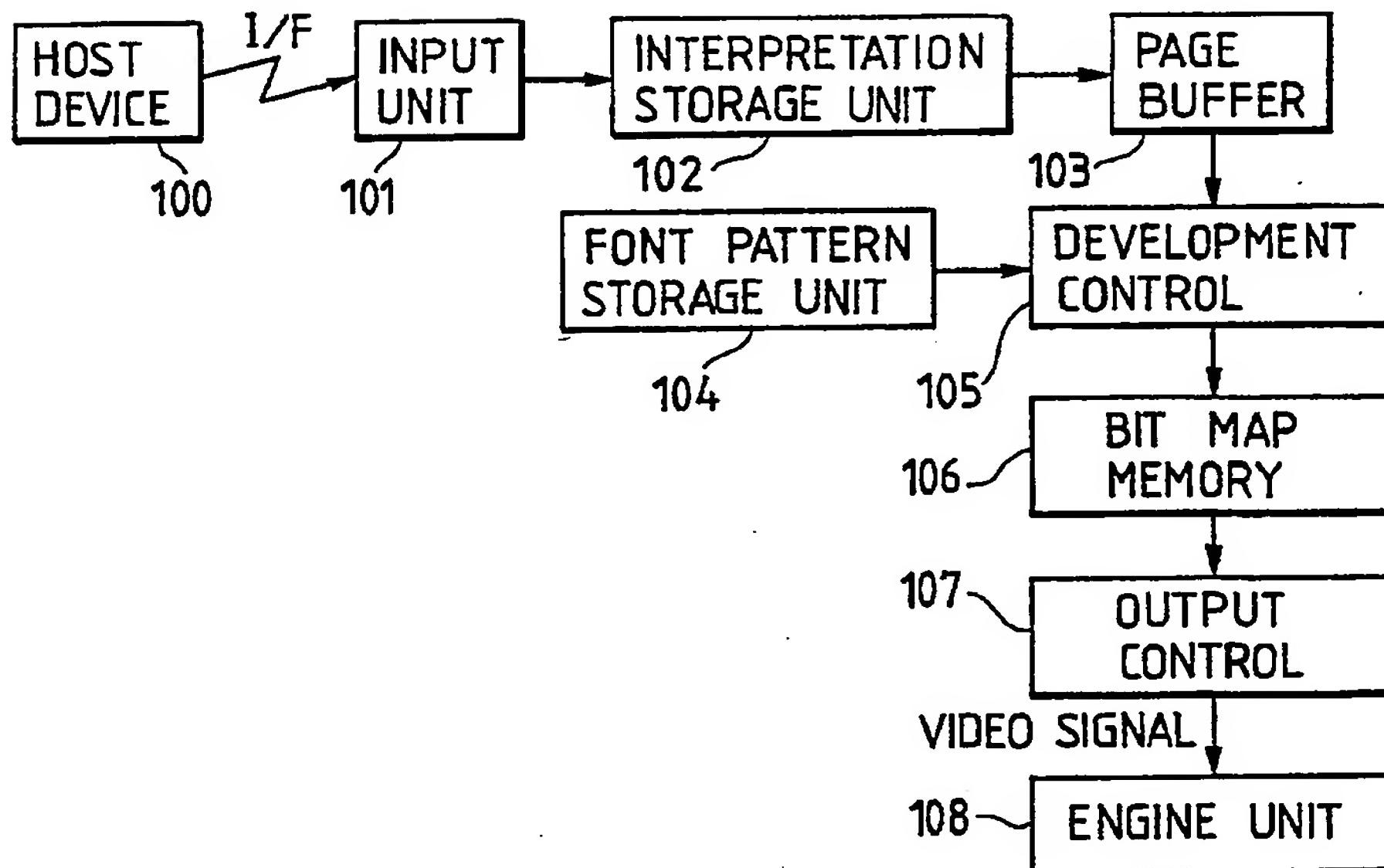
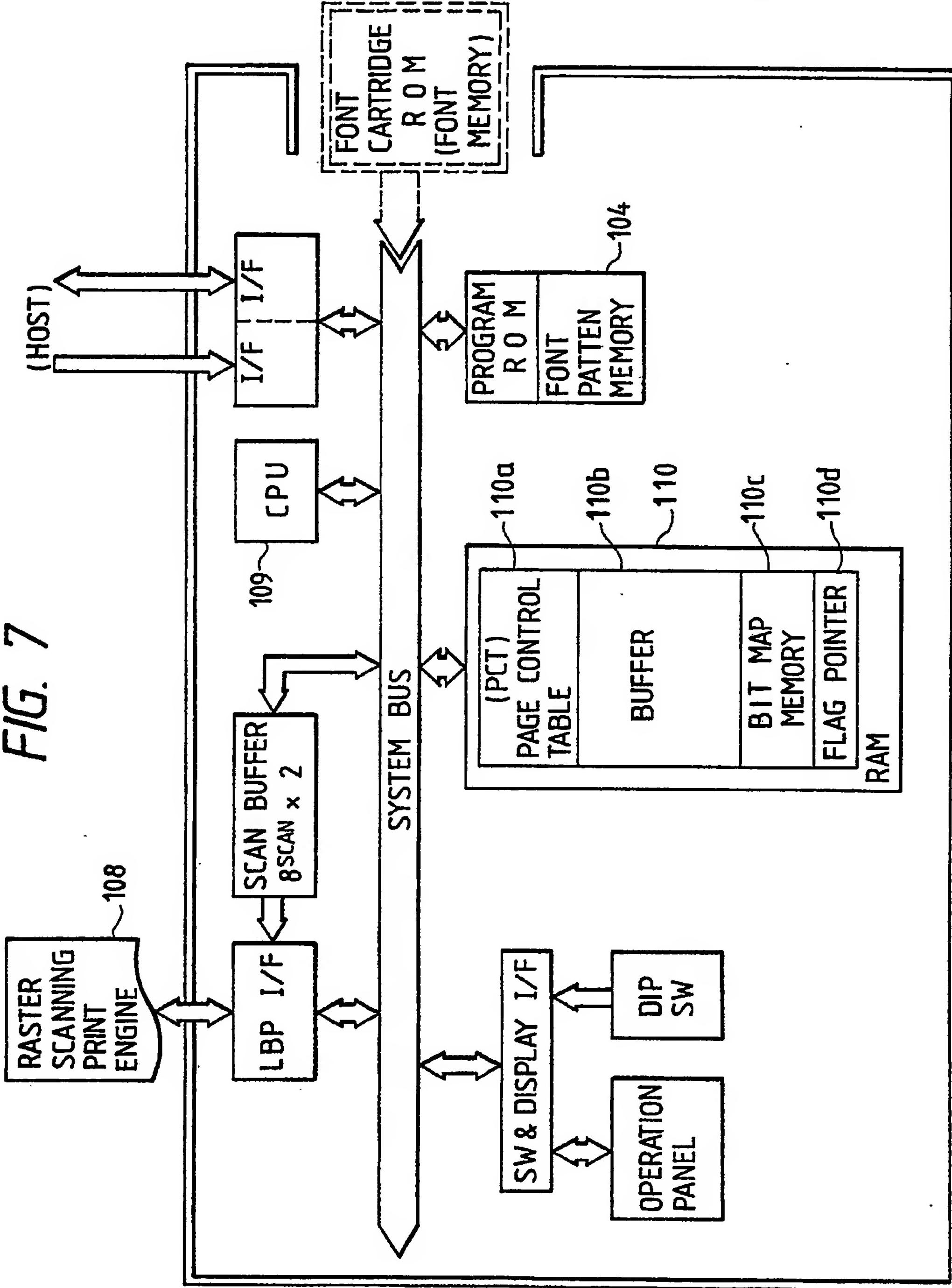


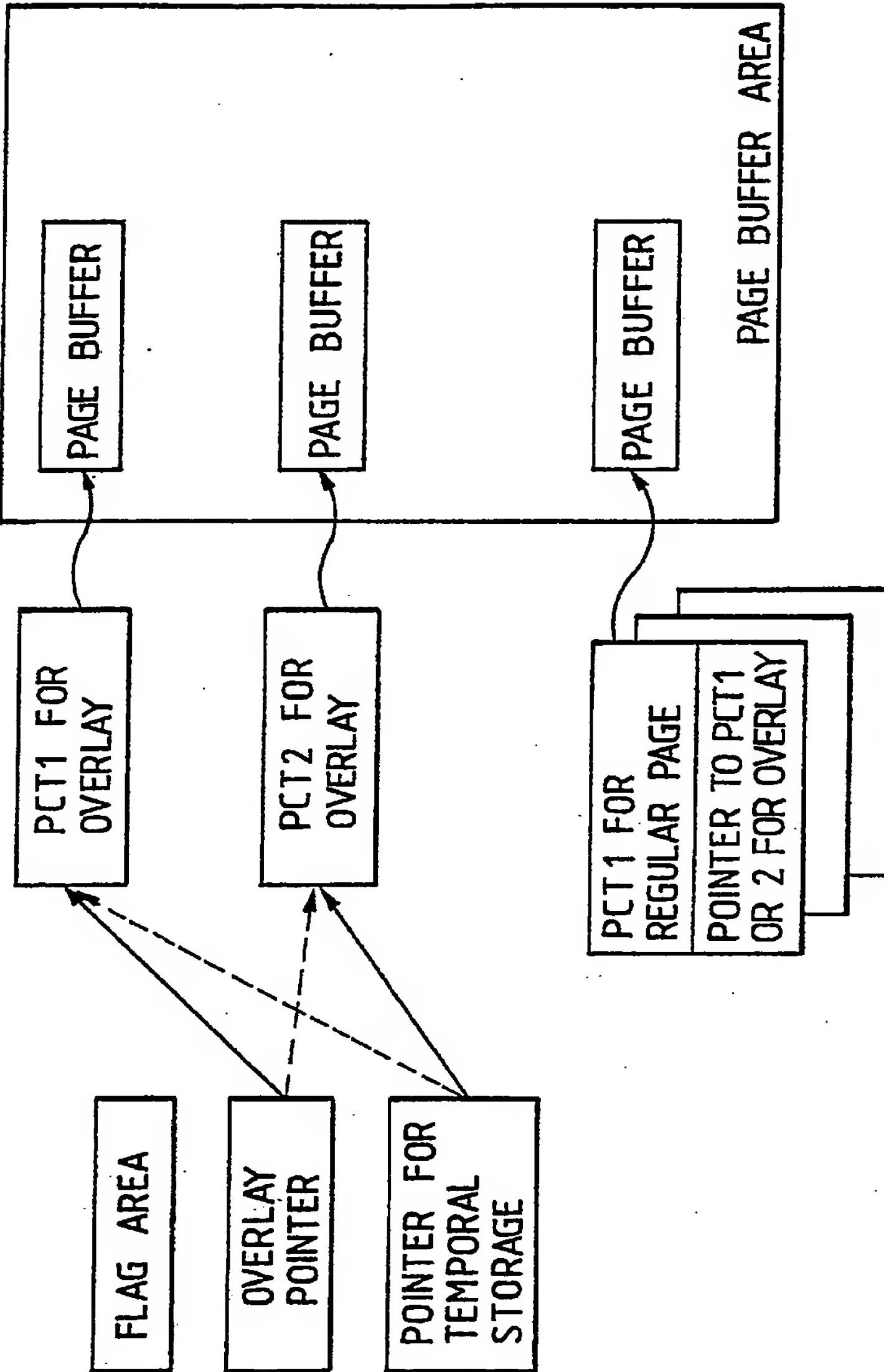
FIG. 7



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FIG. 8



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FIG. 9

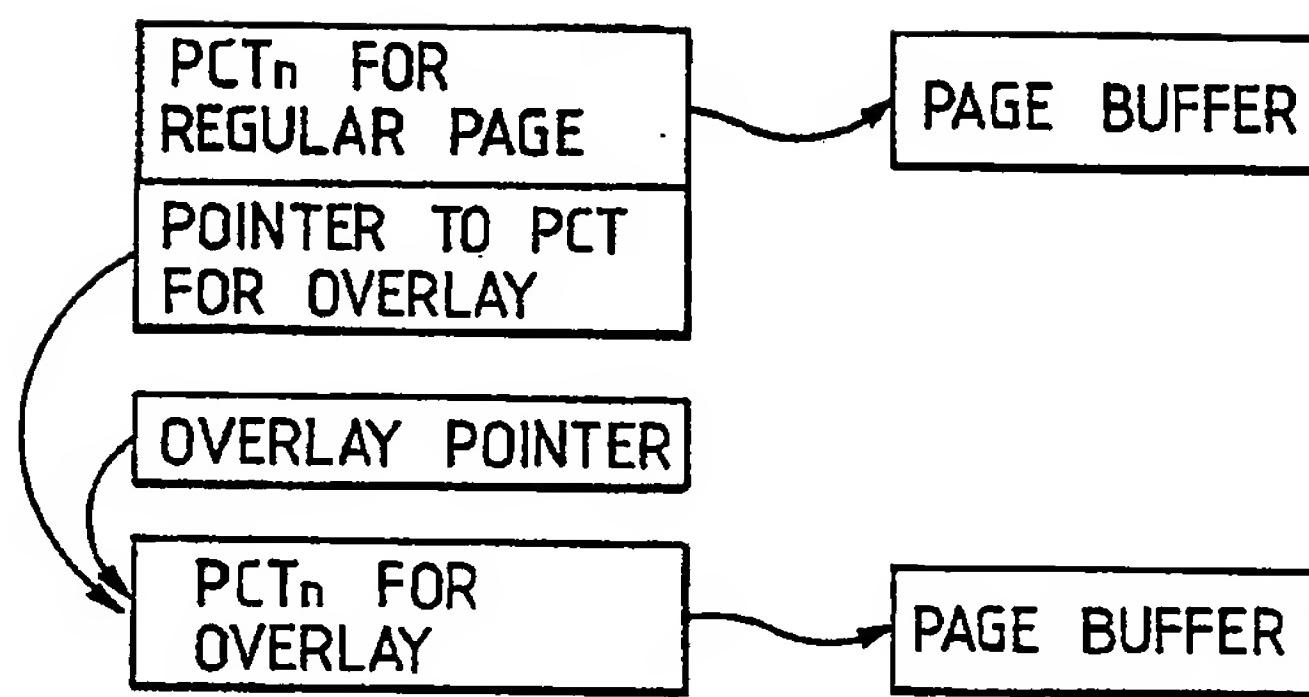
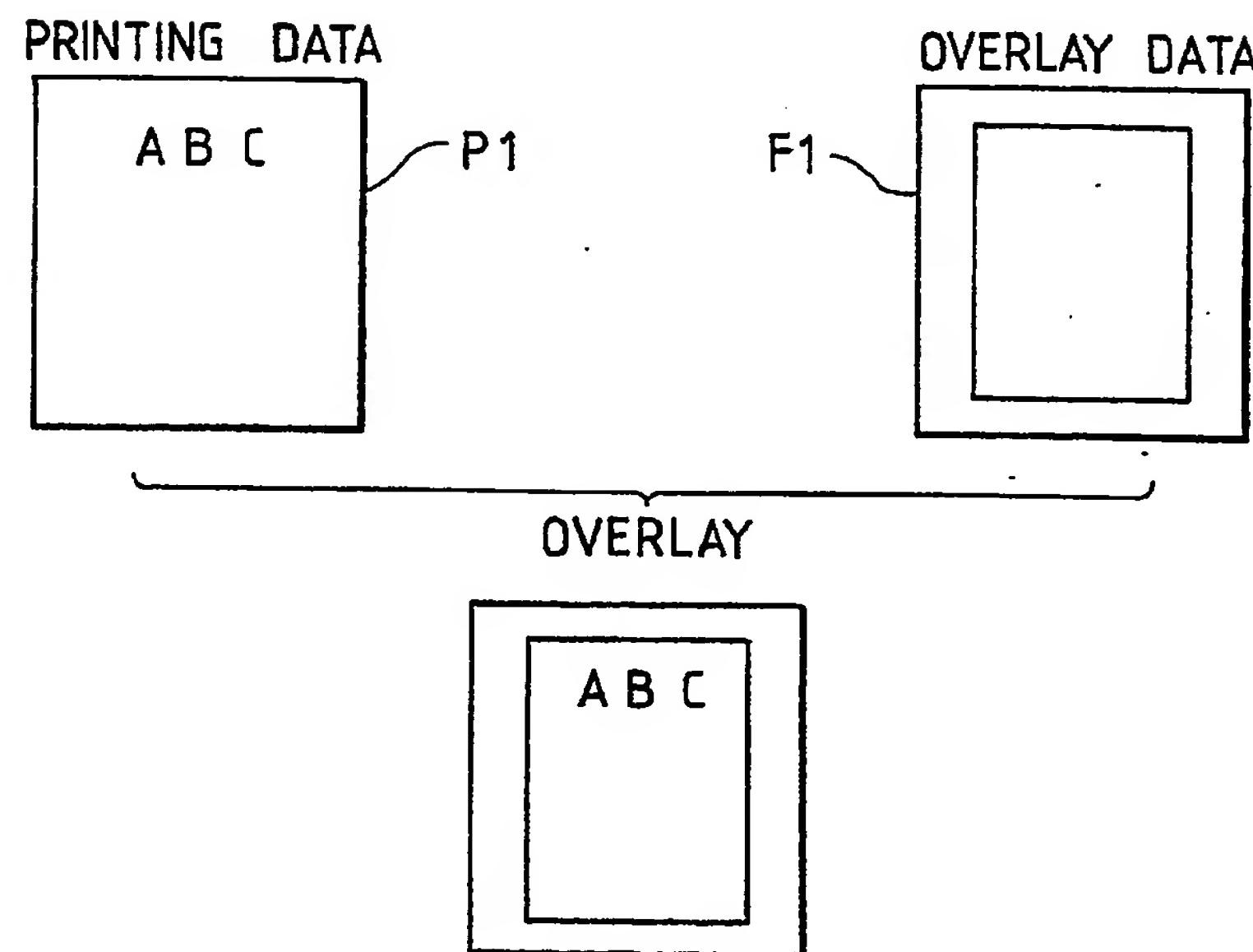


FIG. 10



1 TITLE OF THE INVENTION

Recording Control Apparatus

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BACKGROUND OF THE INVENTION

5 Field of the Invention

The present invention relates to an apparatus for controlling overlay recording in which plural images are overlaid in recording.

Related Background Art

10 There is already proposed a two-side printing apparatus capable of temporarily storing the input print data and selectively printing said data on one face or both faces of a transported sheet-shaped recording medium.

Also there is proposed a two-side printing apparatus provided with form overlay function for overlaying input print data P1 with a fixed format F1 of an account book, a slip or the like, as shown in Fig. 10. In the conventional one-side printing apparatus, the overlay format can be registered between the data of pages, namely immediately after the feeding of form sheet or after the resetting operation. However, in the two-side printing apparatus, the printing operation is possible only when the data are prepared for the first and second faces due to the restriction on the structure of the apparatus. Thus, when the overlay format registered for the first face is registered for the second face, the already registered overlay format

1 is erased and replaced by a new format, so that the
intended result cannot be obtained.

SUMMARY OF THE INVENTION

5 In consideration of the foregoing, an object
of the present invention is to provide a recording
control apparatus capable of precise overlay recording
on a recording material.

10 Another object of the present invention is to
provide a recording control apparatus capable of
efficient overlay recording on both sides of a recording
material.

15 Still another object of the present invention
is to provide a recording control apparatus capable of
secure administration of recording information in the
overlay recording on both sides of a recording material.

20 Still another object of the present invention
is to provide a recording control apparatus capable,
in forming images by overlaying the stored format
information on both sides of the recording material,
of storing the overlay format for the first face and
that for the second face individually according to the
state of printing on both sides, thereby efficiently
effecting the printing on both sides with overlay formats
25 on respectively sides while preventing the loss of or
alteration in the overlay format.

Still another object of the present invention

1 is to provide a recording control apparatus capable,
in overlay recording on both sides, of preventing loss
of or alteration of the already registered overlay data
even if the registration of the overlay information is
5 executed immediately before the start of recording on
respective sides.

The foregoing and still other objects of the
present invention, and the advantages thereof, will
become fully apparent from the following description
10 to be taken in conjunction with the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram of a two-side printing
apparatus embodying the present invention;

15 Fig. 2 is a schematic view showing instruction
of writing into a page control table shown in Fig. 1;

Figs. 3A to 3E are views of states of
registration showing the registration of format
information according to the present invention;

20 Fig. 4 is a flow chart showing an example of
overlay format registration according to the present
invention;

Fig. 5 is a flow chart showing an example of
a sheet discharge ending process according to the
25 present invention;

Fig. 6 is a schematic view showing an example
of overlay printing operation;

1 Fig. 7 is a view showing the flow of data in
another embodiment of the present invention;

Fig. 8 is a block diagram of a control unit
shown in Fig. 7 for data control;

5 Figs. 9 and 10 are views showing a format
information registration process.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

10 Fig. 1 is a block diagram of a two-side printing
apparatus embodying the present invention, in which a
CPU 1 collectively controls the reception of print
information and the supply of print information to a
printer, according to a control program stored in a ROM.

15 An administration information memory 2, composed
for example of a RAM, is provided with a temporary storage
pointer 2a, an overlay pointer 2b, and a flag area 2c.
The overlay pointer 2b functions as instruction means,
for instructing, in succession, the registration of
20 overlay information in page control tables 4a, 4b of a
page control table flag area 4 constituting form
information memory means. An overlay form information
memory unit 5 is composed for example of overlay form
information memories 5a, 5b storing fixed format images
to be overlaid in the two-side printing. An overlay
25 page buffer 6 is composed of a bit map memory, and
serves to store the image data corresponding to the
printing information entered from a data input mechanism

1 3, and arbitrary fixed format image information stored
in the overlay format information memories 5a, 5b and
page control tables 4a, 4b in overlaid manner and to
be subjected to data reading under the control of the
5 CPU 1 for supply of the overlaid image data to an image
forming mechanism through a printer interface 7.

When arbitrary format information to be developed
in the overlay page buffer 6 are stored in the page
control tables 4a, 4b serving for storing plural format
10 information, the CPU 1 selects, in succession, the format
information stored in one of said page control tables
4a, 4b and develops the selected format information in
the overlay page buffer 6, in overlay with the print
information developed therein.

15 When the destinations of storage are designated
by the overlay pointer 2b in succession, in response
to the request for storage of format information
into the page control tables 4a, 4b, the CPU 1
independently administers the format information stored
20 in a page control table 4a designated as first and that
stored in the other page control table 4b designated
as second, thereby maintaining the order of storage.

Also when the CPU 1 administers the format
information stored in a page control table 4a by the
25 temporary storage pointer 2a, the CPU 1 gives priority
to the storage in response to the request for storage
of the format information into the page control table

1 4a, in comparison with that into the other page control
table 4b, thereby temporarily storing the format
information already stored in said page control table
4a. Then, after the two-side printing operation, the
5 temporary storage pointer 2a is cleared, and the content
of the page control table 4a is cleared.

Fig. 2 is a schematic view showing the storage
instructions into the page control tables 4a, 4b shown
in Fig. 1, wherein same components as those in Fig. 1
10 are represented by same numbers.

Figs. 3A to 3E are views of states of
registration, showing the process of format information
registration according to the present invention, wherein
same components as those in Fig. 1 are represented by
15 same numbers. In the following there will be explained
the above-mentioned process.

At first, Fig. 3A shows a state prior to the
preparation of the print data for the first face.
In this state the page control table 4b designated by
20 the temporary storage pointer 2a and the page control
table 4a designated by the overlay pointer 2b do not
have the page buffer and are therefore open. Naturally
the storage flag (set in the flag area 2C) is turned
off.

25 If an overlay registration is conducted in this
area, since the page control table 4a designated by the
overlay pointer 2b is empty, the format image stored

1 in the overlay format information memory 5a is
2 registered in the page control table 4a as shown in
3 Fig. 3B.

Upon completion of the preparation of the page
5 buffer for printing by the reception of the print data
for the first face, the content of the overlay pointer
10 2b, or the top address of the page control table 4a set,
as the address of the page information to be overlaid
in the first face, in the page control table 4a for the
first face.* Then a state shown in Fig. 3C is reached
when an instruction is processed for starting the
registration of a format to be overlaid in the second
face and thereafter. More specifically, the temporary
storage pointer 2a is replaced by the overlay pointer
15 2b designating the page control table 4a of the first
face, by the exchange of the top address of the page
control table 4a designated by the overlay pointer 2b
with that of the page control table 4b designated by
the temporary storage pointer 2a. In this state the
20 storage flag (set in the flag area 2c) is turned on.

The overlay information to be overlaid in the
second face and thereafter is stored, as shown in
Fig. 3D, in the empty page control table 4b designated
by the overlay pointer 2b. After the reception and
25 preparation of the data of the second face, the top
address of the page control table 4b designated by the
present overlay pointer 2b is set as the overlay page

1 information in the page control table 4b constituting
the page control table of the second face. Then, after
the discharge of a sheet on which the data for the first
and second faces are printed, the state of the storage
5 flag is checked. If it is on, it is cleared since the
overlay information in the page control table 4a
designated by the temporary storage pointer 2a is no
longer necessary, and there is thus deleted the
information of the page buffer linked with the page
10 control table 4a designated by the temporary storage
pointer 2a. Thus the information of the one of the page
buffers is cleared as shown in Fig. 3E, whereby a state
shown in Fig. 3B is reached.

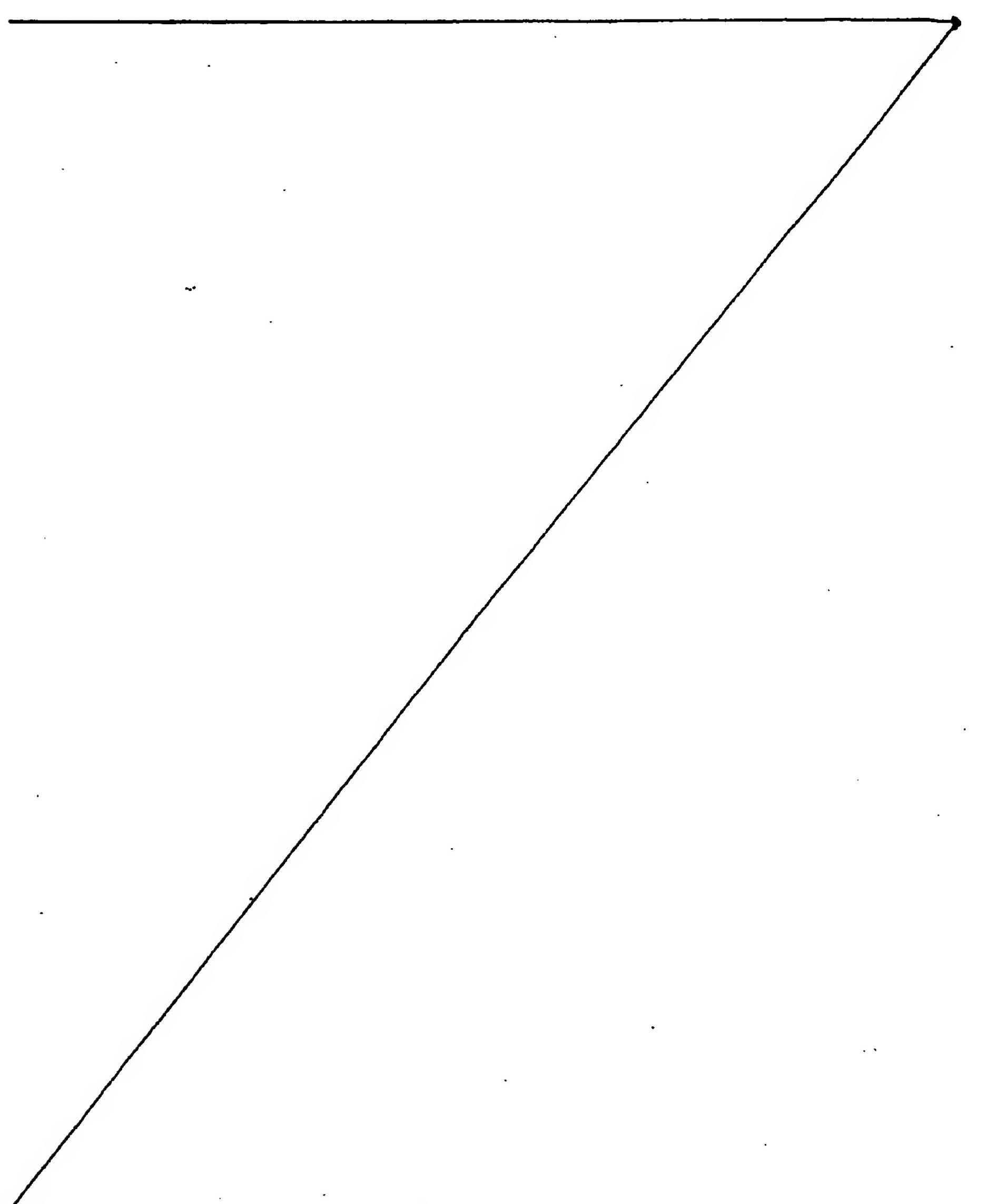
The above-mentioned storage flag is not only
15 provided for the deletion of the page buffer. If an
overlay registration is conducted prior to the reception
of the print data of the second face in a state shown
in Fig. 3D, there is lost the previously stored overlay
information. In order to prevent such situation if
20 an overlay registration is made prior to the reception
of the data of the second face and if the storage flag
is on in such state, the latest registered page control
table 4b designated by the present overlay pointer 2b
is erased, and a new page control table 4b is prepared.

25 In the following there will be explained the
overlay form registration and the sheet discharge
according to the present invention, with reference

1 to Figs. 4 and 5.

Fig. 4 is a flow chart showing an example of
the overlay form registration according to the present
invention, wherein (1) to (7) indicate process steps.

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1 At first CPU 1 executes the initialization of
flags prior to the registration (step 1), and
discriminates whether the state is immediately before
the preparation of the data for the second face (step 2).
5 If not, the sequence proceeds to a step (7). If
affirmative, the CPU 1 discriminates whether the
overlay mode is used in the first face (because, even
when overlay information is registered, there may be a
case in which the instruction for overlay in the first
10 face is not given so that storage is not necessary)
(step 3). If said discrimination turns out negative,
the sequence proceeds to the step (7). If it turns out
affirmative, the CPU turns on the storage flag in order
to execute the storage (step 5), then exchanges the
15 content designated by the current overlay pointer 2b
with that designated by the temporary storage pointer 2a
(step 6), and executes deletion if the overlay information
is already linked to the page control table designated
by the overlay pointer 2b, thereby enabling registration
20 (step 7).

Fig. 5 is a flow chart showing an example of the
sheet discharge process of the present invention, wherein
(1) to (3) indicate process steps.

At first the CPU 1 discriminates the state of
25 the storage flag (step 1), and, if it is off, the process
is terminated. If it is on, the CPU turns off the
storage flag (step 2), then deletes the page information

1 in the page control table designated by the temporary
storage pointer 2a (step 3), and terminates the process.

5 In the foregoing there has been explained the
temporary storage of the overlay form information in
order to prevent alteration therein, in case of form
overlays on both faces, but the present invention is
likewise applicable to the two-side printing of
externally registered characters.

10 As an example, let us consider a case of
registering a character "(2)" for the first face, under
a code "7777_H". If a character "(C)" is externally
registered for the same code "7777_H" immediately before
the printing of the second face, all the characters "(2)"
on the first face are altered to "(C)".

15 However, different externally registered
character patterns can be printed on both faces of the
recording medium with a same code, by permitting the
existence of the character "(2)" registered for the
first face and the characters "(C)" registered for the
20 second face under a same code. After the sheet discharge,
there is deleted the externally registered character
patterns (2) only, that has become unnecessary.

25 In the following there will be explained the
data flow in another embodiment of the present invention,
with reference to Fig. 6. Various data, such as
character code data or data on the number of copies,
sent for example from a host computer is supplied through

1 an input unit 101 to an interpretation/storage unit 102,
in which the input data are discriminated for example as
character code data, data on the number of copies, data
on size etc. and are stored in respective areas of a
5 page buffer 103. The character code data read from the
page buffer 103 are converted into dot patterns in a
development control unit 105, based on a font pattern
stored in a font pattern storage unit 104, and are
stored in a bit map memory 106. The dot patterns read
10 from the bit map memory 106 are converted into video
signals in an output control unit 107, and are supplied
to a printing engine unit 108. Said engine unit 108 is
for example a laser beam printer utilizing a laser and
an electrophotographic process in combination, wherein
15 said video signals are supplied to a laser driver,
thereby activating said laser and effecting the printing
operation.

Fig. 7 is a block diagram of a control unit for
realizing the data flow shown in Fig. 6, wherein
20 equivalent components to those in Fig. 6 are represented
by same numbers. The functions of the interpretation/
storage unit 102, development control unit 105 and
output control unit 107 are performed by a CPU 109.
The buffer memory 103 and the bit map memory 106
25 correspond respectively to areas 110b, 110c of a RAM 110.
The buffer memory area 110b, is so constructed as to be
capable of storing data of plural pages. There are

1 further provided a page control table area 110a, and
an area 110b for various flags and pointers.

Fig. 8 illustrates the relationship between the
page control table and the page buffer.

5 The data sent from the host apparatus are either
data for ordinary page or those for overlay, and the
method of storage in the printing apparatus is made
different accordingly. For the data of ordinary page,
the page buffer storing the print data is controlled by
10 the page control table for ordinary page.

On the other hand, for the data of overlay page,
the overlay print data are stored in the page buffer
under the control by the overlay page control table.

In case of overlaying the overlay data on an
15 ordinary page, the ordinary page is linked with the
overlay page, as shown in Fig. 9, by storing the address
of the page control table for overlay indicated by the
overlay pointer, in the pointer for the overlay page
control table, included in the page control table for
20 ordinary page.

If overlay information is further registered in
the above-mentioned state (prior to the reception of
data of the second ordinary page), the overlay information
for the first ordinary page becomes altered, as the
25 content of the overlay page control table indicated by the
overlay pointer is replaced. For this reason, the flag is
turned on to exchange the page control table designated by
the overlay pointer and that designated by the temporary

1 storage pointer, whereby the overlay pointer designates
the empty page control page while the temporary storage
pointer retains the page control table containing the
previous overlay information. In this manner the
5 above-mentioned registration is rendered possible.

After said registration, if there is an instruction to
overlay the overlay information on the second ordinary
page, the newly registered overlay information is linked.

The printing process is started after the print
10 data for two pages are prepared. The overlay information
and the ordinary data for the second face are developed
in the bit map memory area, from which said data are
read and printed on the second face of the recording
medium. Then the overlay information and the ordinary
15 data for the first face are developed in said bit map
memory area and printed on the first face of the
recording medium. After the recording medium is
discharged, the page buffer of the overlay page control
table designated by the temporary storage pointer is
20 released (flag off).

The overlay form registration and the sheet
discharge mentioned above are similar to those already
explained in relation to Figs. 4 and 5, and will not,
therefore, be explained further.

25 The above-explained control provides advantages
of preventing the alteration or loss of the already
registered overlay information by the new registration

1 of overlay information, and achieving precise overlaid
printing of the print information and format information
specific to each print face.

The present invention is not limited to the
5 foregoing embodiments but is subject to various
modifications within the scope and spirit of the
appended claims.

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1 WHAT IS CLAIMED IS:

1. A recording control apparatus comprising:
input means for entering data from an external equipment;
- 5 first memory means for storing format data;
output means for outputting the data entered from said input means and the format data stored in said first memory means in overlaid manner; and
second memory means, at the storage of new
10 format data in said first memory means, for storing previous format data.
2. An apparatus according to claim 1, further comprising first designating means for indicating said new format data, and second designating means for indicating said previous format data.
- 15 3. An apparatus according to claim 2, wherein,
at the first storage of format data, said first
20 designating means is adapted to designate said first memory means, and, at the succeeding storage of said new format data, said first designating means is adapted to designate said second memory means while
said second designating means is adapted to designate
25 said first memory means.
4. An apparatus according to claim 1, wherein

the format data stored in said first and second memory means are recording data for respectively different faces of a recording material.

5 5. Recording apparatus for recording first printing data and overlay data, comprising means for enabling entry of sets of overlay data in series whereby a first entered set of overlay data may be retained whilst a second entered set of overlay data is
10 executed.

6. Apparatus as claimed in claim 5, wherein said apparatus is capable of double sided recording and different sets of overlay data may be employed for
15 recording on each side.

7. Recording apparatus arranged, constructed and adapted to operate substantially as hereinbefore described with reference to Figure 1, or Figure 7, or
20 Figures 1 to 3E, or Figures 1 to 3E, 4, 5 and/or 6, or Figures 7 and 8, with or without the description of Figures 9 and/or 10.

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